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(54) Title: METHOD AND SYSTEM FOR EXCHANGING INFORMATION WITH A MEMORY STRUCTURE IN A PORTABLE OBJECT
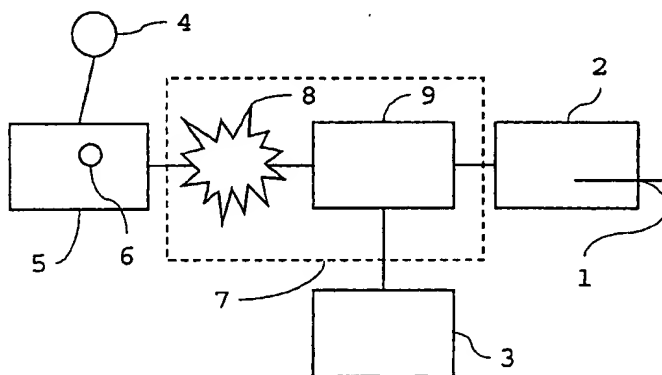
(57) Abstract: A method is disclosed for exchanging information contained in a portable object (1), e.g. a smart card. The method uses a computer (5), connected to a network (7), e.g. the internet. In one step of this method, a user (4) establishes a connection between the memory structure and a data interchange unit (2), connected to the network (7). The method subsequently uses a software agent (6) to direct the exchange. Furthermore, a system is disclosed with the same objective. The system comprises a portable object (1), e.g. a smart card, containing a memory structure for storing the information. The system also comprises a computer (5), connected to a network (7), e.g. the internet. It further comprises one or more data interchange units (2, 3), connected to the network (7). The data interchange units (2, 3) comprise means permitting a user (4) to establish a connection to the memory structure. The system further comprises a software agent (6) and means for prompting the software agent (6) to direct the exchange of information after establishment of the connection of the memory structure to a data interchange unit (2). A computer program is further disclosed, which is loadable into a computer (5, 9, 11). A computer (5, 9, 11) programmed in this way is capable of, or adapted to, use in the above-mentioned method and it can be comprised in the above-mentioned system.

Method and system for exchanging information with a memory structure in a portable object.

The invention pertains to a method for exchanging information with a memory structure contained in a portable object, e.g. a smart card, using a computer, connected to a network, e.g. the internet, wherein the user establishes a
5 connection between the memory structure and a data interchange unit connected to the network. The invention also pertains to a system for exchanging information according to this method.
Portable objects containing memory structures for
10 storing information are many and varied in shape and use. They can, for instance be issued to shop assistants, in the shape of pens for insertion into cash registers, or to users of a building, in the shape of electronic keys for unlocking certain doors. One of the more ubiquitous examples is the
15 smart card. Such information carriers are issued by credit card companies, health insurers, universities and retailing organisations.
The information stored in the memory can be equally varied in range and contents. Examples are credit
20 history, personal details of the owner or profiles of the owner characterising his preferences or status.
Problems occur for most owners, when they wish to read or alter the information stored in the memory structure. Most owners do not possess the means for reading or
25 altering the contents of the memory structure. In addition, a user has little control over the types of information an organisation puts into the memory or retrieves from it. Thus, in the case of a customer loyalty card, he cannot restrict access to the information to certain retailers.
30 Likewise, in the case of a health insurance card, he cannot provide the memory structure with a set of rules restricting access to certain data fields to his doctor.

There may be a great many machines available to
the user, which are physically capable of reading or alter-
ing the information in the memory structure. In current
practice, many of these data exchange units are not avail-
5 able to users, because they contain no means to read or
write the data in the specific format required for the card.
Thus, a user cannot use the retailer's system to alter the
information on his health insurance card.

In cases where the data exchange unit is capable
10 of reading or altering the information on the card, the lim-
ited means provided to the user for entering or reading
information can provide a bottleneck. Banks, for instance,
do not provide their smart card-enabled automatic teller ma-
chines with elaborate means of display or keyboards. On the
15 other hand, many of these machines are connected to comput-
ers with just such means through networks. Again, however,
there are obstacles to the effective use of such networks,
since the computer on which the information has been stored
needs to establish a connection with the particular data ex-
20 change unit to which the user has, at some later time,
connected the object containing the memory structure. This
data exchange unit will in almost all cases have been chosen
at random from one of many.

It is an object of the present invention to im-
25 prove the above-described method and system.

To this end, the method makes use of a software
agent to direct the exchange of information. The system com-
prises means for prompting the software agent to direct the
exchange of information after the user has connected the
30 memory structure to a data interchange unit.

Thus, the software agent can take care of the many
tasks associated with an effective exchange of information.
The information can be entered on one computer in the net-
work and loaded into the memory structure at any time in the
35 future and through any data interchange unit connected to
that network, at the user's convenience. The type and amount

of information exchanged can be restricted by providing the
software agent with appropriate instructions.

    The invention will now be explained in further de-
tail, with reference to the drawings.

5   Figure 1 schematically shows a simple diagram of
an example of a system according to the present invention.

    Figures 2a-2f schematically illustrates several
consecutive steps, which are possible in an embodiment of
the method according to the present invention.

10   Figure 3 shows a simple schematic diagram of a
similar system according to the present invention, in order
to illustrate certain aspects of alternative embodiments of
the present invention.

    Figure 1 shows a schematic diagram, containing the
15   essential characteristics of a system according to the pres-
ent invention. In this example, the system is used to
exchange information with a memory structure, contained in a
portable object 1. This portable object 1 could, for in-
stance, be a plastic card, of dimensions similar to a credit
20   card. Other possible examples are objects shaped like trans-
ponder keys, as used in automotive security systems to
identify drivers, or shaped like pens, as used with cash
registers to identify till attendants.

    The system also comprises a number of data ex-
25   change units 2,3, of which two are schematically shown in
figure 1. Of course, there could be any number of data ex-
change units 2,3 in the system.

    The system can be used to transfer information,
initially entered by a user 4, to the memory structure on
30   object 1. Resident on computer 5 is a software agent 6, com-
prising the means to direct the transfer of this information
into the memory structure contained in object 1. Computer 5
could be the user's personal computer at home, equipped with
a modem, or it could be a personal digital assistant, able
35   to establish a wireless connection.

    In the embodiment of figure 1, the software agent
resides on the computer 5 with which the user 4 entered the

information, but this is not a necessary aspect of the pres-
ent invention. An alternative would be to have the software
agent 6 wait on a central server 9, which is a permanent
part of a network 7. Likewise, the information need not be
5   stored on computer 5. It could be stored on a different com-
puter, somewhere in the remaining part 8 of network 7. In
this case, the software agent 6 could contain a pointer to
the storage location. Alternatively, the information can be
encoded in the software agent 6, thus moving around with it.
10   The system contains means for alerting the soft-
ware agent 6 to the presence of object 1 in data exchange
unit 2. Such means can be provided to the data exchange unit
2 in the shape of a button or a system which automatically
detects the presence of the memory structure. In the em-
15   bodiment depicted in fig. 1, data exchange unit 2 passes a
signal to computer 5 by means of computer 9, thus prompting
the software agent 6 to direct the transfer of information.
            With reference to figures 2a-f, eight steps in an
embodiment of a method according to the present invention
20   are schematically depicted. The numbering of the various
components of the system used in this method is based in
part on that of figure 1.
            A computer or workstation 5 is connected to net-
work 7, for example the internet. A central computer 9 is
25   also connected to network 7 and to a data exchange unit 2,
optionally by means of a further computer. The said data
exchange unit 2 can be one of many similar units directly or
indirectly connected to the central computer 9. The central
computer 9 is run, for instance, by an organisation, which
30   issues portable objects comprising memory structures, e.g.
smart cards. The organisation can be a bank, a credit card
company, a retailer, etc. The computer 5 can be a personal
computer, which belongs to user 4, but this need not be the
case, as explained in the discussion of figure 1.
35   Loaded into the memory structure of the portable
object 1 are data, for example characterising the user 4 or
his interests. The information could equally well represent

a record of the user's past purchases in stores belonging to
a certain retailing company. Such information allows the or-
ganisation to tailor their offers to the interests and
profile of the user 4. In the sort of systems presently used
5   by such organisations, the possibilities open to the user 4
for viewing or altering the information are limited or non-
existent.

A method and system according to the present in-
vention open up a wealth of new possibilities to the user.
10   Besides directing the technical processes involved in the
transfer of information, the smart agent can also be pro-
vided with rules, to direct the correct information to the
intended recipient. These rules could instruct it to act on
the user's behalf. For example, the agent could negotiate a
15   discount from a retailing organisation in return for provid-
ing the organisation with the user's details.
Alternatively, it could only provide the user's address to
organisations, that wish to send samples of their product.

Using a method according to the present invention
20   the user 4 can view or edit the information in the following
way.

Each user is issued a software agent 6. Each
software agent 6 is provided with a unique code, in order to
identify it. This enables the system discern the software
25   agent 6 to prompt, when the user 4 has connected a particu-
lar memory structure to the system. This feature allows
several software agents and/or memory structures to be used
in the system at the same time.

The software agent 6 can initially reside in com-
30   puter 5, as in figure 2a, but another computer within
network 7 is also a possible location, as is the central
computer 9. The user 4 can pass instructions to the software
agent, as shown schematically in figure 2b, using computer
5. These instructions can be many and varied in nature, de-
35   pending on the use of the system. In the example of a
customer loyalty card, they can be instructions to restrict
the information available to the retailer to address details

or purchases of a particular kind. Alternatively, they can
comprise rules, programming the software agent 6 to disclose
information only to certain types of organisations.

The means allowing the user to pass instructions
5   to the software agent 6 will generally comprise a type of
graphical user interface to facilitate step 2b. If the soft-
ware agent 6 is on some other computer within network 7, a
kind of web interface would be a likely means for the user 4
to pass instructions to the software agent 6. Alternatively,
10   the organisation issuing software agent 6 could provide user
4 with special software, for use on computer 5.

As soon as software agent 6 has been provided with
the necessary instructions, it can move to the central com-
puter 9, or some other computer within network 7 to which
15   data interchange unit 2 is attached. Such a situation is de-
picted in figure 2c, where the software agent 6 lies
waiting.

After the memory structure has been connected to
data interchange unit 2, the software agent 6 is prompted to
20   direct the exchange of information with the memory struc-
ture. This step is depicted in figure 2d, and the subsequent
exchange of information is depicted in figure 2e.

In figure 2f, the situation is shown, wherein the
memory structure has been disconnected from the data inter-
25   change unit 2, by removing the object 1 in which it is
contained. The software agent 6, here shown in computer 9,
can now be recalled by the user, or it can have been in-
structed beforehand to move to a different computer, for
example the user's computer 5.

30   Referring to figure 3, several aspects are de-
picted of alternative embodiments, which more fully exploit
the characteristics of software agents 6,10. In this embodi-
ment, at least one other software agent 10 is used to be
able to instruct the first software agent 6 where to find
35   the memory structure and data exchange unit 2 in amongst a
plurality of data exchange units 2,3 to which similar memory
structures can be connected.

  In one embodiment, the second software agent 10 is
carried in the memory structure and transferred into the
network 7 through data interchange unit 2. In alternative
embodiments, the second software agent 10 is initially

5 stored in the data exchange unit 2 or a computer 9 connected
to the data exchange unit 2.

  In each case, the software agents 6, 10 are able
to move from one computer 9 to the other 11, as depicted by
step B in figure 3. This capability to direct a software

10 agent 6,10 from one computer to another is provided by so-
called agent runtime environments or agent host platforms,
which the computers 5,9,11 have been programmed to run.

  The system further allows two software agents 6,10
to exchange information, step A in figure 2. One software

15 agent 10 can thus tell the other software agent 6 to move to
another computer. This exchange of information A is again
made possible by the agent runtime environment.

  Further features of the software agent 6,10 and
the agent runtime environment are disclosed in more detail

20 in Dutch Patent Applications 1013249 and 1013250 from the
same applicant. It will be obvious to one skilled in the
art, that the communication between software agent 6 and the
object 1 containing the memory structure and that amongst
software agents 6,10 makes use of the standard protocols for

25 ensuring secure communication. In addition, the runtime en-
vironment on a computer 5,9,11 can be programmed to restrict
software agents 6,10 in them to certain types of actions. In
such a way, the spread of viruses or illicit information
through the network 7 can be prevented. Likewise, the soft-

30 ware agent 6 can be instructed to direct the exchange of
only certain types of information from and to the smart
card.

  Once the software agent 6 for directing the ex-
change of information has been made aware of the presence of

35 object 1 in data exchange unit 2 by the second software
agent 10, it can then move to a computer 9 from which it can

8

direct the exchange of information with the memory structure
contained in the object 1.

     It will be obvious that in cases where the infor-
mation is to be moved\from the memory structure to a

5   computer within network 7, the same method is used. In par-
ticular, the steps whereby the software agent 6 is prompted
to direct the transfer of information and where it is di-
rected to a suitable computer are the same.

     In an alternative embodiment, the software agent 6

10 directing the exchange of information can initially be con-
tained in the memory structure of the portable object 1.
Thus the user 4 can carry the software agent 6 around with
him. Again, the software agent 6 can be used to transfer
data from the memory structure to a computer in the network

15 7, or to retrieve information from this computer.

     In such an embodiment, the software agent 6 is
transferred to the network 7 after the user 4 has connected
the memory structure to the data interchange unit 2. It can
then proceed to search for the computer with which to ex-

20 change the information, making use of the methods described
above.

     In the embodiments described above, the process of
data transfer from and to the memory structure contained in
the portable object 1 involves running the software agent 6

25 on a suitable computer 9 connected in some way to the data
interchange unit 2 or contained in it. This means that the
portable object 1 need only be provided with a memory struc-
ture in which to store the information and, optionally, the
software agent 6. Such a use has the advantage, that the ob-

30 ject 1 can be provided with a limited amount of storage
capacity. For example, the object 1 can be a card with a
magnetic strip for a memory structure. A software agent 6
would provide a relatively simple card 1 with a large amount
of extra functionality, when connected to a computer 9

35 through a card reader 2.

     As an alternative, the object 1, containing the
memory structure could also be provided with a processor,

capable of running all or part of the instructions contained
in the software agent 6. An example of such an object 1 is a
smart card, where memory structure and processor form an in-
tegral whole. Such a processor need not be very

5   sophisticated. For example, its use could be restricted to
supervising the process of transfer of the software agent to
a more powerful computer within network 7. The part of the
software agent 6, which requires more computing capacity
would then be run on this computer. In this way, extra func-

10 tionality would again be provided to an object of. limited
resources.

        The embodiments described in the above are to be
considered as mere examples, in no way limiting the extent
of the invention, which can be varied in a number of ways

15 according to the scope of the claims.

CLAIMS

1. Method for exchanging information with a memory structure contained in a portable object (1), e.g. a smart card, using a computer (5), connected to a network (7), e.g. the internet, wherein a user (4) establishes a connection

5   between the memory structure and a data interchange unit (2) connected to the network (7) **characterised in that** the method uses a software agent (6) to direct the exchange.

2. Method according to claim 1, wherein the establishment of a connection between the memory structure and a

10 data interchange unit (2) prompts the software agent (6) to direct the exchange of information.

3. Method according to any of claims 1-2, wherein the software agent (6) moves through the network (7) between the computer (5) and a second computer (9), also attached to

15 the network (7), wherein the second computer (9) enables the software agent (6) to direct the exchange of information.

4. Method according to any of claims 1-3, wherein the agent (6) communicates with a second software agent (10) and wherein the second software agent (10) prompts the soft-

20 ware agent (6) to direct the exchange.

5. Method according to any of the preceding claims, wherein at least a part of the software agent (6) is loaded into the memory structure.

6. Method according to claim 5, wherein the soft-

25 ware agent (6) moves from the memory structure to the computer (9), from which it directs the exchange of information.

7. Method according to any of the preceding claims, wherein the software agent (6) is provided with

30 rules regarding the contents of the information of which it is to direct the exchange.

8. System for exchanging information comprising a portable object (1), e.g. a smart card, containing a memory structure for storing the information,

a computer (5), connected to a network (7), e.g. the inter-
net,

and

one or more data interchange units (2), connected to the

5   network (7), with means for a user (4) of establishing a
connection to the memory structure **characterised in that** the
system comprises a software agent (6) and means for prompt-
ing the software agent (6) to direct the exchange of
information after establishment of the connection of the

10   memory structure to a data interchange unit (2).

9. System according to claim 8, wherein a computer
(11) is programmed to direct communication between the soft-
ware agent (6) and a second software agent (10), wherein the
software agent (6) is uniquely labelled and the communica-

15   tion serves to identify the software agent (6), the user (4)
and the data interchange unit (2) to which the memory struc-
ture is connected.

10. System according to claim 8 or 9, wherein the
computers (5,9,11) are programmed to run only specific types

20   of instructions which the software agent (6,10) can com-
prise.

11. System according to any of claims 8-10, fur-
ther comprising :

a second computer (9), connected to the computer (5) through

25   a part (8) of the network (7), comprising means to enable
the software agent (6) to direct the exchange of informa-
tion; and

means for allowing the software agent (6) to move between
the two computers.

30   12. System according to any of claims 8-11, fur-
ther comprising means, e.g. a web interface, allowing the
user (4) to communicate with the software agent (6).

13. System according to any of claims 8-12,
whereby the memory structure is capable of storing all or

35   part of the software agent (6).

14. System according to any of claims 8-13,
wherein the portable object (1) further contains a processor
and the software agent (6) comprises instructions executable
by the processor.

5   15. System according to any of claims 8-14,
wherein the memory structure consists of magnetic domains,
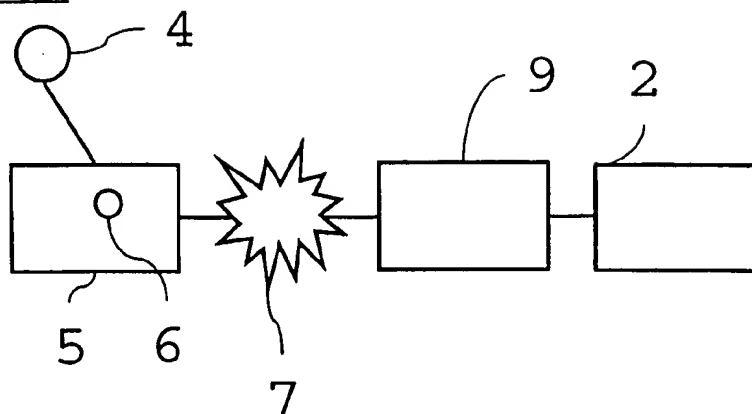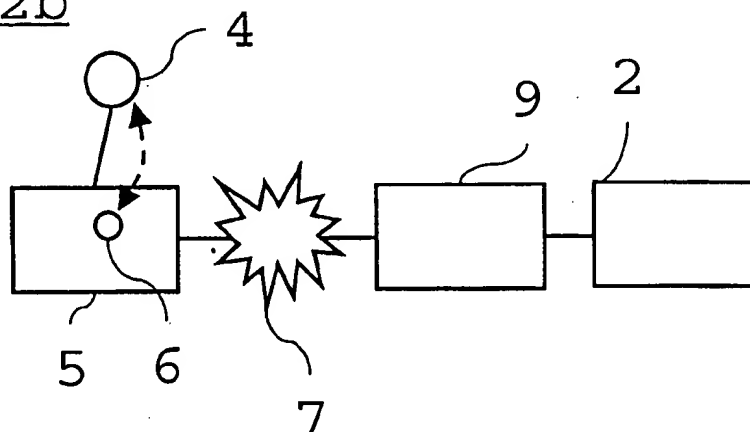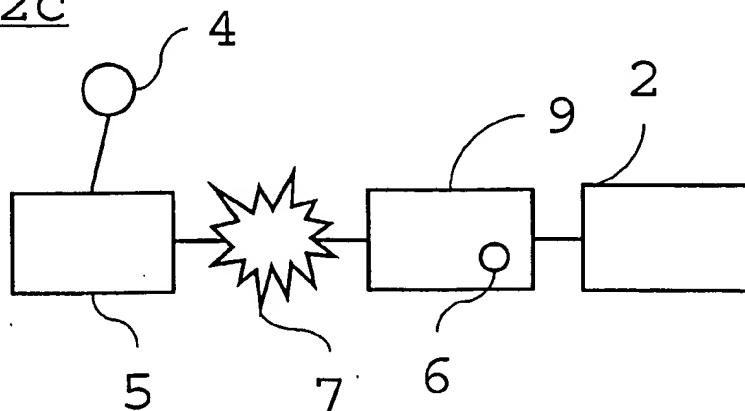representing the information.

16. A computer program, loadable into a computer
(5,9,11) so that the computer (5,9,11) programmed in this
10   way is capable of or adapted to carrying out a method ac-
cording to any of claims 1-7 and capable of or adapted to
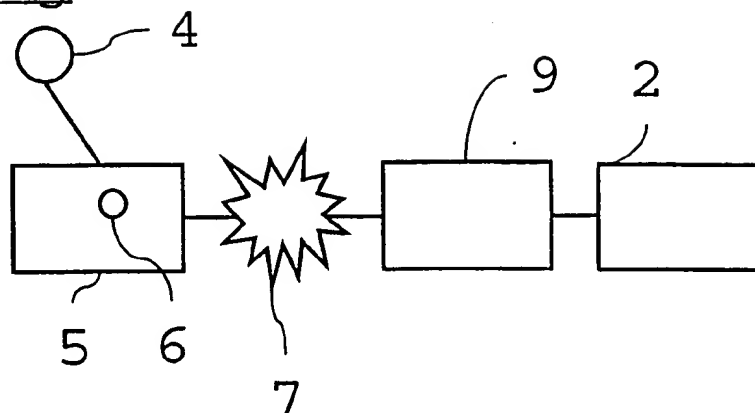use in a system according to any of claims 8-15.

1/5

Fig. 1
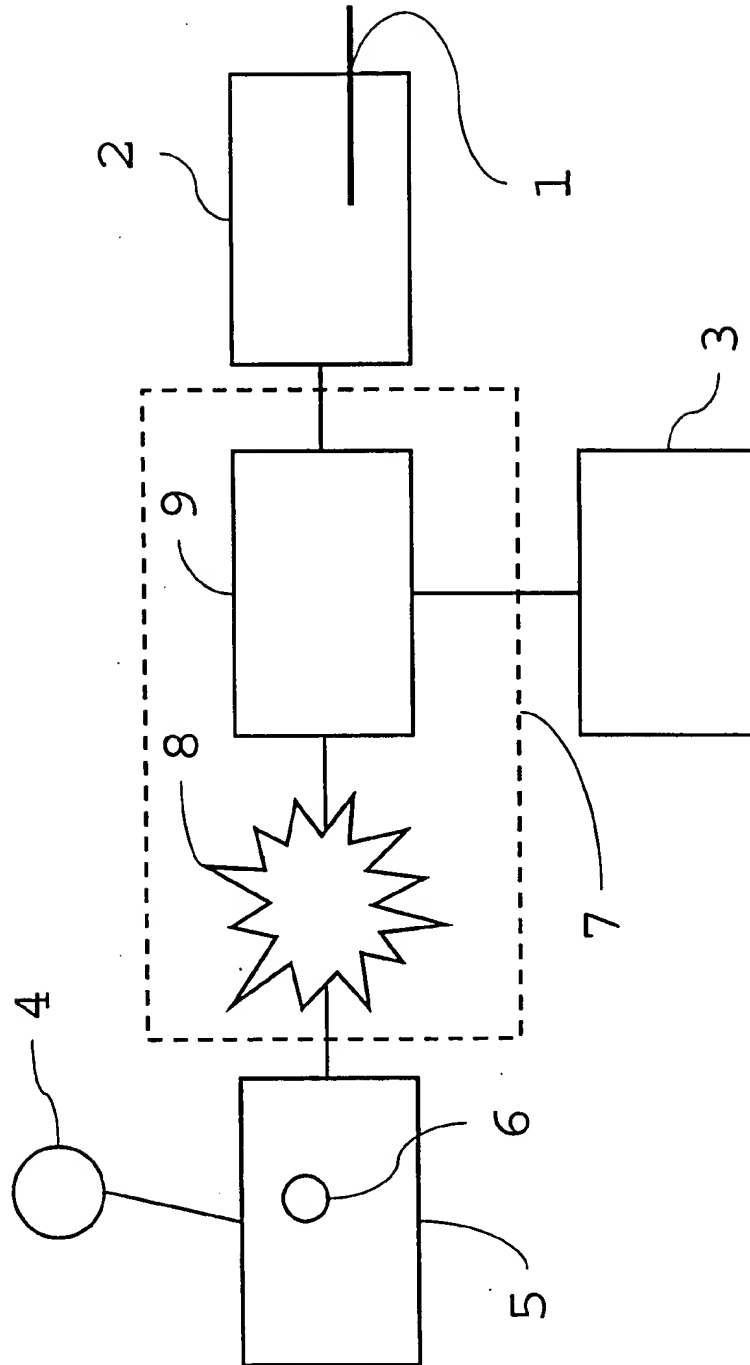
Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2d
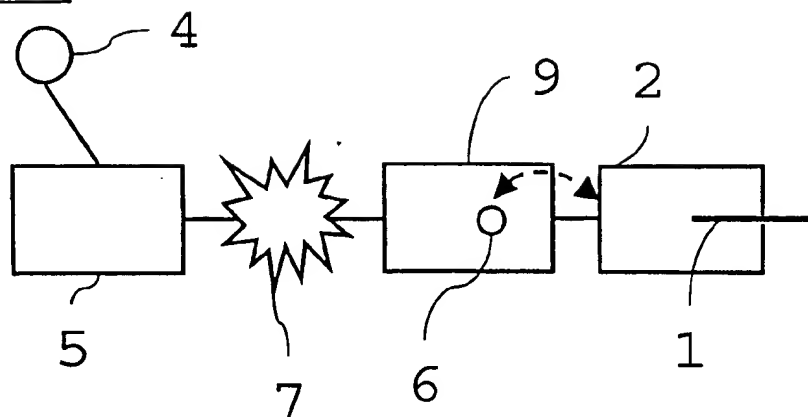
Fig. 2e
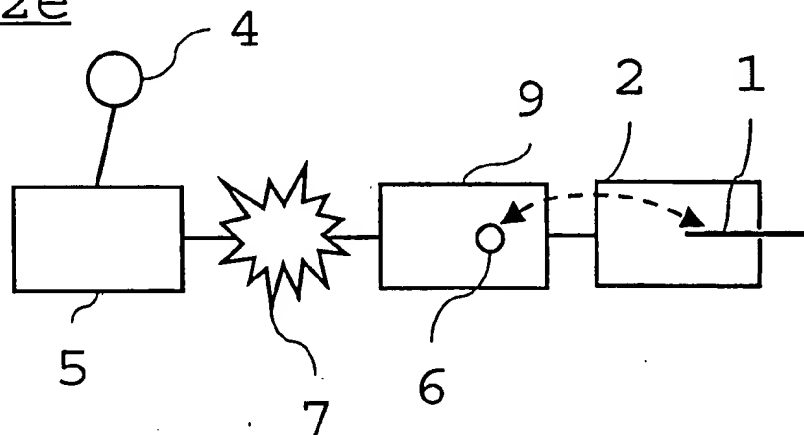
Fig. 2f

4/5

Fig. 2g

Fig. 2h
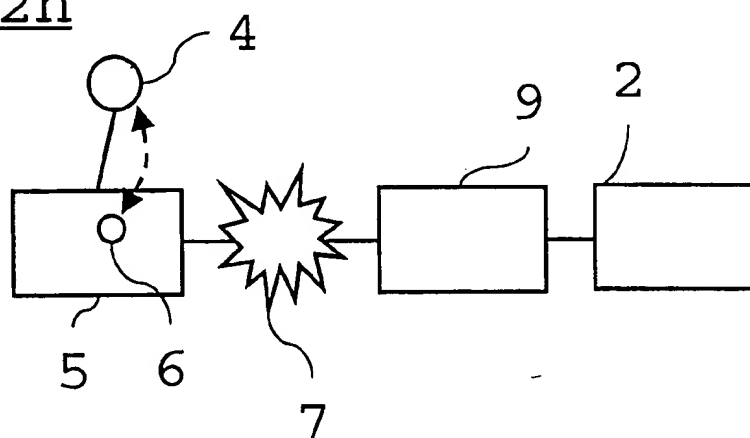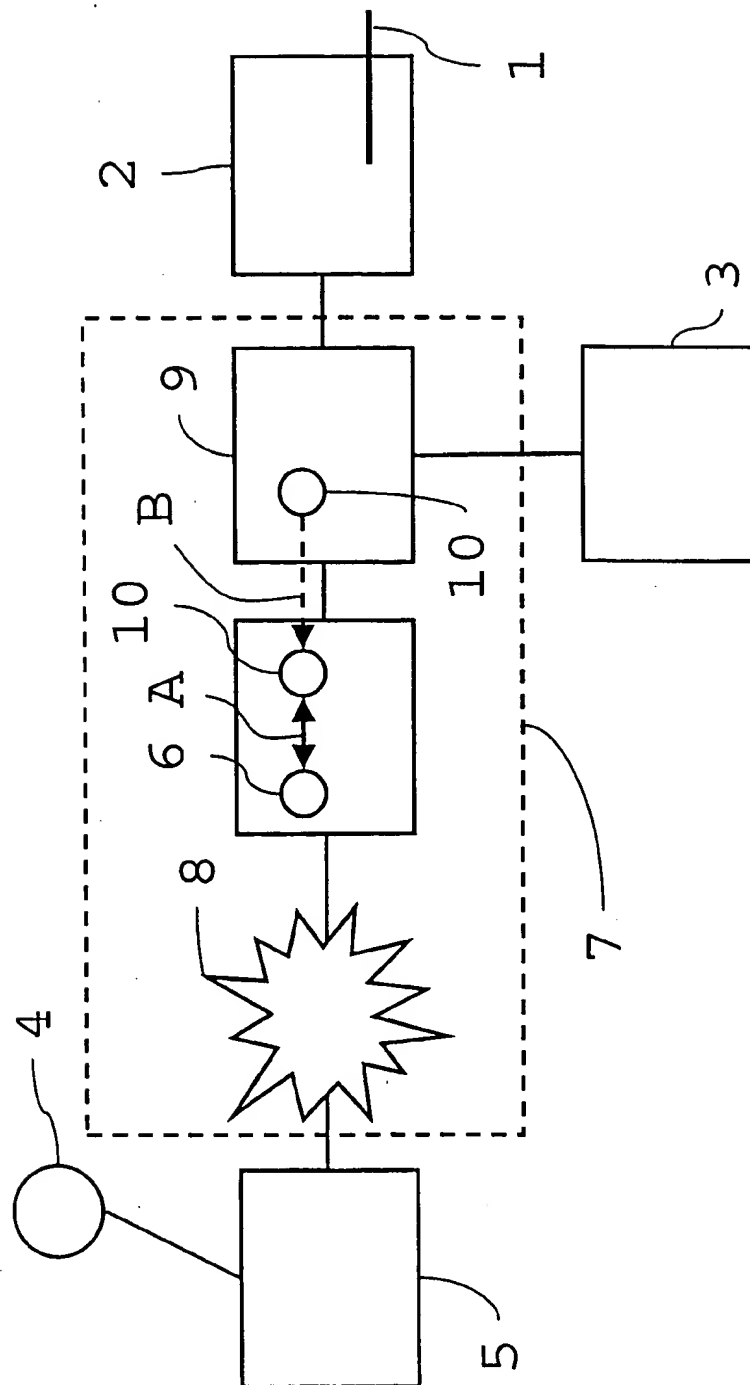
Fig. 3

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G07F   G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 924 667 A (IBM) 23 June 1999 (1999-06-23) column 2, line 17 -column 3, line 25	1,8,10, 16
Y	claims 1,3,4,8; figure 1	5,7,13, 14

X	EP 0 953 946 A (NCR INT INC) 3 November 1999 (1999-11-03) column 2, line 9 - line 42 column 9, line 18 -column 10, line 11 claims 1,3,9; figures 3-5	1,3,8,16

X	US 5 905 245 A (TANAKA HIROSHI) 18 May 1999 (1999-05-18) page 1, line 23 - line 52 column 5, line 29 -column 6, line 42 figures 1-4,14-17	1,8,16

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[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

'A' document defining the general state of the art which is not considered to be of particular relevance

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'O' document referring to an oral disclosure, use, exhibition or other means

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'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 May 2001	13/06/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040. Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Paraf, E

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document. with indication.where appropriate. of the relevant passages	Relevant to claim No.
Y	EP 0 360 613 A (BALLY MFG CORP) 28 March 1990 (1990-03-28) column 5, line 4 - line 24; figures 2-4	5,7,13, 14
A	column 5, line 53 -column 6, line 18 column 7, line 18 -column 52; claim 1	11

A	WO 97 36265 A (VRIEND GERRIT) 2 October 1997 (1997-10-02) page 1, line 1 - line 11; claim 1	1,8,16

A	EP 0 889 429 A (ST MICROELECTRONICS SA) 7 January 1999 (1999-01-07) column 1, line 25 - line 39; figure 1 column 2, line 23 - line 32; claim 1 column 3, line 32 - line 45	1,8,16

A	US 5 942 738 A (GERARD YVES ET AL) 24 August 1999 (1999-08-24) claims; figure 1	1,5,8, 13,16

INTERNATIONAL SEARCH REPORT

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0924667	A	23-06-1999	DE	19755819 C	26-08-1999
EP 0953946	A	03-11-1999	BR	9901330 A	18-01-2000
			JP	2000113090 A	21-04-2000
			BR	9901331 A	18-01-2000
			EP	0953947 A	03-11-1999
			JP	11353406 A	24-12-1999
US 5905245	A	18-05-1999	JP	9171546 A	30-06-1997
EP 0360613	A	28-03-1990	US	5179517 A	12-01-1993
			AT	116754 T	15-01-1995
			AU	613484 B	01-08-1991
			AU	3450489 A	29-03-1990
			DE	68920391 D	16-02-1995
			DE	68920391 T	27-07-1995
WO 9736265	A	02-10-1997	NL	1002733 C	30-09-1997
			CA	2249294 A	02-10-1997
			EP	0890158 A	13-01-1999
EP 0889429	A	07-01-1999	FR	2765706 A	08-01-1999
			JP	11073479 A	16-03-1999
			US	6149058 A	21-11-2000
US 5942738	A	24-08-1999	FR	2734937 A	06-12-1996
			CA	2219823 A	05-12-1996
			DE	69604288 D	21-10-1999
			DE	69604288 T	03-02-2000
			EP	0829071 A	18-03-1998
			ES	2136411 T	16-11-1999
			WO	9638826 A	05-12-1996
			JP	11505947 T	25-05-1999